STUDENT ID NO

MULTIMEDIA UNIVERSITY

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FINAL EXAMINATION

TRIMESTER 2, 2016/2017

PMT0301 – MATHEMATICS III

(All sections/ Groups)

1 MAR 2017
9.00 a.m. – 11.00 a.m.
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This question paper consists of **TEN** printed pages excluding cover page and statistical table.
2. Answer **ALL** FIVE questions. All questions carry equal marks and the distribution of the marks for each question is given.
3. Please write all your answers in the **QUESTION PAPER**. All necessary working steps **MUST** be shown.

Question 1

a) Find the parametric equation of the line passing through the point $(-1, 2, 4)$ that is parallel to the line joining $A(1, -3, 3)$ and $B(-4, -2, 2)$. [2marks]

b) Find the angle between the planes $2x + y + 3z = 4$ and $3x + 2y + 2z = 6$. [3 marks]

c) Find the sum of the geometric series $1 + 4 + 16 + ... + 16384$. [3 marks]

Continued...

d) Find the term that contains x^5 in the expansion of $(3x+2y)^{15}$. [2 marks]

Continued...

Question 2

a) Solve the system of linear equations with inverse matrix.

[6 marks]

$$2x - 3y + 5z = 14$$
$$4x - y - 2z = -17$$
$$-x - y + z = 3$$

Continued...

b) Let $A=\begin{bmatrix} 11 & 18 & 7 \\ a & 6 & 3 \\ -3 & -5 & -2 \end{bmatrix}$, $B=\begin{bmatrix} 3 & 1 & 12 \\ b & -1 & -5 \\ -2 & 1 & -6 \end{bmatrix}$ and $C=\begin{bmatrix} 0 & 1 & -3 \\ 2 & 4 & \frac{1}{2} \end{bmatrix}$

i) Compute the values of a and b so that A is the inverse of B while B is the inverse of A. [2 marks]

ii) Calculate CA. [2 marks]

Continued...

Question 3

The following table shows the scores of the final examination grade for an elementary statistics course by a **sample** of 50 students.

Money (in RM)	Number of students
50 – 59	8
60 – 69	10
70 – 79	16
80 – 89	9
90 – 99	7
TOTAL	**50**

a) Compute the midpoint, class boundaries, $\sum mf$ and $\sum m^2 f$. [2 marks]

Class Limit	f	Midpoint, m	Class boundaries	mf	$m^2 f$
50 – 59	8				
60 – 69	10				
70 – 79	16				
80 – 89	9				
90 – 99	7				
TOTAL	**50**				

b) Calculate the mean. Give your answer correct to 2 decimal places. [2 marks]

Continued...

c) Calculate the median. Give your answer correct to 2 decimal places. [2 marks]

d) Calculate the mode. Give your answer correct to 2 decimal places. [2 marks]

e) Calculate the standard deviation. Give your answer correct to 2 decimal places. [2 marks]

Continued....

Question 4

a) During a committee election, each member must elect a committee of five people from candidates consist of six boys and five girls. Find the probability that the committee will have two girls and three boys if a certain girl must be in the committee.

[2 marks]

b) A box contains 8 oranges, 5 apples and 17 lemons. Three fruits are picked out at random from the box, find the probability that the first two fruits picked out are of the same types.

[3 marks]

Continued...

c) A survey on the preferences of the fresh graduates upon completing their bachelor's degree whether to enter straight into the workforce (W) or to further their studies (S) is carried out. The following is the observation of a total 200 I.T. fresh graduates according to their gender and preferences:

Gender \ Preference	Study (S)	Work (W)	Total
Male (M)	18	102	120
Female (F)	12	68	80
Total	30	170	200

i) If a fresh graduate is selected at random, find the probability that the fresh graduate prefers to further study (S), given that the fresh graduate is a female (F). [2 marks]

ii) Are events 'Female (F)' and 'Work (W)' statistically independent? Explain your answer. [3 marks]

Continued....

Question 5

a) Given the probability for a car to have life expectancy of at least 25 years is 0.67. Among 10 such cars,

i) Find the probability that at least 8 cars will have life expectancy of at least 25 years. Give your answer correct to 4 decimal places. [2 marks]

ii) Find the probability that at most 1 car will have life expectancy of less than 25 years. Give your answer correct to 4 decimal places. [3 marks]

Continued...

b) The number of marriages per day in a district follows a Poisson distribution with a mean of 3. Find the probability that less than 2 marriages will occur on two given days. Give your answer correct to 4 decimal places. [2 marks]

c) Given that the weight of the adult chicken is normally distributed with a mean of $2.1kg$ and a standard deviation of $0.5kg$. What is the probability that the adult chicken weight is within $0.45\ kg$ from the mean weight? (3 marks)

End of Page

FORMULAE LIST

Vector

Dot Product:

$$\mathbf{u}\cdot\mathbf{v}=u_1v_1+u_2v_2+u_3v_3 \quad \text{or} \quad \mathbf{u}\cdot\mathbf{v}=\|\mathbf{u}\|\|\mathbf{v}\|\cos\theta$$

Cross Product:

$$\mathbf{u}\times\mathbf{v}=\begin{vmatrix}\mathbf{i}&\mathbf{j}&\mathbf{k}\\u_1&u_2&u_3\\v_1&v_2&v_3\end{vmatrix}=\begin{vmatrix}u_2&u_3\\v_2&v_3\end{vmatrix}\mathbf{i}-\begin{vmatrix}u_1&u_3\\v_1&v_3\end{vmatrix}\mathbf{j}+\begin{vmatrix}u_1&u_2\\v_1&v_2\end{vmatrix}\mathbf{k}$$

Line Equation in 3D space:

$$\mathbf{r}=\mathbf{r}_0+t\mathbf{v}$$

Plane Equation in 3D space:

$$\mathbf{n}.(\mathbf{r}-\mathbf{r}_0)=0$$

Mode

$$L+\left[\frac{f_m-f_B}{(f_m-f_A)+(f_m-f_B)}\right]c$$

Median

$$L+\left(\frac{\frac{\sum f}{2}-f_L}{f_m}\right)c$$

Mean

Ungrouped Data		Grouped Data	
Sample	**Population**	**Sample**	**Population**
$\bar{x}=\frac{\sum x}{n}$	$\mu=\frac{\sum x}{N}$	$\bar{x}=\frac{\sum mf}{\sum f}$	$\mu=\frac{\sum mf}{\sum f}$

Variance

Ungrouped Data	
Sample	**Population**
$s^2=\frac{\sum x^2-\frac{(\sum x)^2}{n}}{n-1}$	$\sigma^2=\frac{\sum x^2-\frac{(\sum x)^2}{N}}{N}$
Grouped Data	
Sample	**Population**
$s^2=\frac{\sum m^2f-\frac{(\sum mf)^2}{\sum f}}{\sum f-1}$	$s^2=\frac{\sum m^2f-\frac{(\sum mf)^2}{\sum f}}{\sum f}$

Conditional Probability

$$P(A|B)=\frac{P(A\cap B)}{P(B)}$$

Independent Event

$$P(A|B)=P(A) \text{ or } P(B|A)=P(B) \text{ or } P(A\cap B)=P(A)\cdot P(B)$$

Binomial

$$P(X=x)=\binom{n}{x}p^xq^{n-x} \quad ; \quad \mu=np \quad ; \quad \sigma=\sqrt{npq}$$

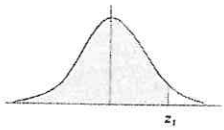
Poisson

$$P(X=x)=\frac{\lambda^x e^{-\lambda}}{x!} \quad ; \quad \mu=\lambda \quad ; \quad \sigma=\sqrt{\lambda}$$

Standard Normal

$$z=\frac{x-\mu}{\sigma}$$

Standard Normal Distribution



$$p(z \le z_1) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{z_1} e^{-\frac{1}{2}z^2} dz$$

The Normal Distribution Function

x	Φ(X)	x	Φ(X)	x	Φ(X)	x	Φ(X)
0.00	0.5000	0.50	0.6915	1.00	0.8413	1.50	0.9332
0.01	0.5040	0.51	0.6950	1.01	0.8438	1.51	0.9345
0.02	0.5080	0.52	0.6985	1.02	0.8461	1.52	0.9357
0.03	0.5120	0.53	0.7019	1.03	0.8485	1.53	0.9370
0.04	0.5160	0.54	0.7054	1.04	0.8508	1.54	0.9382
0.05	0.5199	0.55	0.7088	1.05	0.8531	1.55	0.9394
0.06	0.5239	0.56	0.7123	1.06	0.8554	1.56	0.9406
0.07	0.5279	0.57	0.7157	1.07	0.8577	1.57	0.9418
0.08	0.5319	0.58	0.7190	1.08	0.8599	1.58	0.9429
0.09	0.5359	0.59	0.7224	1.09	0.8621	1.59	0.9441
0.10	0.5398	0.60	0.7257	1.10	0.8643	1.60	0.9452
0.11	0.5438	0.61	0.7291	1.11	0.8665	1.61	0.9463
0.12	0.5478	0.62	0.7324	1.12	0.8686	1.62	0.9474
0.13	0.5517	0.63	0.7357	1.13	0.8708	1.63	0.9484
0.14	0.5557	0.64	0.7389	1.14	0.8729	1.64	0.9495
0.15	0.5596	0.65	0.7422	1.15	0.8749	1.65	0.9505
0.16	0.5636	0.66	0.7454	1.16	0.8770	1.66	0.9515
0.17	0.5675	0.67	0.7486	1.17	0.8790	1.67	0.9525
0.18	0.5714	0.68	0.7517	1.18	0.8810	1.68	0.9535
0.19	0.5753	0.69	0.7549	1.19	0.8830	1.69	0.9545
0.20	0.5793	0.70	0.7580	1.20	0.8849	1.70	0.9554
0.21	0.5832	0.71	0.7611	1.21	0.8869	1.71	0.9564
0.22	0.5871	0.72	0.7642	1.22	0.8888	1.72	0.9573
0.23	0.5910	0.73	0.7673	1.23	0.8907	1.73	0.9582
0.24	0.5948	0.74	0.7704	1.24	0.8925	1.74	0.9591
0.25	0.5987	0.75	0.7734	1.25	0.8944	1.75	0.9599
0.26	0.6026	0.76	0.7764	1.26	0.8962	1.76	0.9608
0.27	0.6064	0.77	0.7794	1.27	0.8980	1.77	0.9616
0.28	0.6103	0.78	0.7823	1.28	0.8997	1.78	0.9625
0.29	0.6141	0.79	0.7852	1.29	0.9015	1.79	0.9633
0.30	0.6179	0.80	0.7881	1.30	0.9032	1.80	0.9641
0.31	0.6217	0.81	0.7910	1.31	0.9049	1.81	0.9649
0.32	0.6255	0.82	0.7939	1.32	0.9066	1.82	0.9656
0.33	0.6293	0.83	0.7967	1.33	0.9082	1.83	0.9664
0.34	0.6331	0.84	0.7995	1.34	0.9099	1.84	0.9671
0.35	0.6368	0.85	0.8023	1.35	0.9115	1.85	0.9678
0.36	0.6406	0.86	0.8051	1.36	0.9131	1.86	0.9686
0.37	0.6443	0.87	0.8078	1.37	0.9147	1.87	0.9693
0.38	0.6480	0.88	0.8106	1.38	0.9162	1.88	0.9699
0.39	0.6517	0.89	0.8133	1.39	0.9177	1.89	0.9706
0.40	0.6554	0.90	0.8159	1.40	0.9192	1.90	0.9713
0.41	0.6591	0.91	0.8186	1.41	0.9207	1.91	0.9719
0.42	0.6628	0.92	0.8212	1.42	0.9222	1.92	0.9726
0.43	0.6664	0.93	0.8238	1.43	0.9236	1.93	0.9732
0.44	0.6700	0.94	0.8264	1.44	0.9251	1.94	0.9738
0.45	0.6736	0.95	0.8289	1.45	0.9265	1.95	0.9744
0.46	0.6772	0.96	0.8315	1.46	0.9279	1.96	0.9750
0.47	0.6808	0.97	0.8340	1.47	0.9292	1.97	0.9756
0.48	0.6844	0.98	0.8365	1.48	0.9306	1.98	0.9761
0.49	0.6879	0.99	0.8389	1.49	0.9319	1.99	0.9767
0.50	0.6915	1.00	0.8413	1.50	0.9332	2.00	0.9772

x	Φ(X)	x	Φ(X)	x	Φ(X)	x	Φ(X)
2.00	0.97725	2.50	0.99379	3.00	0.99865	3.50	0.99977
2.01	0.97778	2.51	0.99396	3.01	0.99869	3.51	0.99978
2.02	0.97831	2.52	0.99413	3.02	0.99874	3.52	0.99978
2.03	0.97882	2.53	0.99430	3.03	0.99878	3.53	0.99979
2.04	0.97932	2.54	0.99446	3.04	0.99882	3.54	0.99980
2.05	0.97982	2.55	0.99461	3.05	0.99886	3.55	0.99981
2.06	0.98030	2.56	0.99477	3.06	0.99889	3.56	0.99981
2.07	0.98077	2.57	0.99492	3.07	0.99893	3.57	0.99982
2.08	0.98124	2.58	0.99506	3.08	0.99896	3.58	0.99983
2.09	0.98169	2.59	0.99520	3.09	0.99900	3.59	0.99983
2.10	0.98214	2.60	0.99534	3.10	0.99903	3.60	0.99984
2.11	0.98257	2.61	0.99547	3.11	0.99906	3.61	0.99985
2.12	0.98300	2.62	0.99560	3.12	0.99910	3.62	0.99985
2.13	0.98341	2.63	0.99573	3.13	0.99913	3.63	0.99986
2.14	0.98382	2.64	0.99585	3.14	0.99916	3.64	0.99986
2.15	0.98422	2.65	0.99598	3.15	0.99918	3.65	0.99987
2.16	0.98461	2.66	0.99609	3.16	0.99921	3.66	0.99987
2.17	0.98500	2.67	0.99621	3.17	0.99924	3.67	0.99988
2.18	0.98537	2.68	0.99632	3.18	0.99926	3.68	0.99988
2.19	0.98574	2.69	0.99643	3.19	0.99929	3.69	0.99989
2.20	0.98610	2.70	0.99653	3.20	0.99931	3.70	0.99989
2.21	0.98645	2.71	0.99664	3.21	0.99934	3.71	0.99990
2.22	0.98679	2.72	0.99674	3.22	0.99936	3.72	0.99990
2.23	0.98713	2.73	0.99683	3.23	0.99938	3.73	0.99990
2.24	0.98745	2.74	0.99693	3.24	0.99940	3.74	0.99991
2.25	0.98778	2.75	0.99702	3.25	0.99942	3.75	0.99991
2.26	0.98809	2.76	0.99711	3.26	0.99944	3.76	0.99992
2.27	0.98840	2.77	0.99720	3.27	0.99946	3.77	0.99992
2.28	0.98870	2.78	0.99728	3.28	0.99948	3.78	0.99992
2.29	0.98899	2.79	0.99736	3.29	0.99950	3.79	0.99992
2.30	0.98928	2.80	0.99744	3.30	0.99952	3.80	0.99993
2.31	0.98956	2.81	0.99752	3.31	0.99953	3.81	0.99993
2.32	0.98983	2.82	0.99760	3.32	0.99955	3.82	0.99993
2.33	0.99010	2.83	0.99767	3.33	0.99957	3.83	0.99994
2.34	0.99036	2.84	0.99774	3.34	0.99958	3.84	0.99994
2.35	0.99061	2.85	0.99781	3.35	0.99960	3.85	0.99994
2.36	0.99086	2.86	0.99788	3.36	0.99961	3.86	0.99994
2.37	0.99111	2.87	0.99795	3.37	0.99962	3.87	0.99995
2.38	0.99134	2.88	0.99801	3.38	0.99964	3.88	0.99995
2.39	0.99158	2.89	0.99807	3.39	0.99965	3.89	0.99995
2.40	0.99180	2.90	0.99813	3.40	0.99966	3.90	0.99995
2.41	0.99202	2.91	0.99819	3.41	0.99968	3.91	0.99995
2.42	0.99224	2.92	0.99825	3.42	0.99969	3.92	0.99996
2.43	0.99245	2.93	0.99831	3.43	0.99970	3.93	0.99996
2.44	0.99266	2.94	0.99836	3.44	0.99971	3.94	0.99996
2.45	0.99286	2.95	0.99841	3.45	0.99972	3.95	0.99996
2.46	0.99305	2.96	0.99846	3.46	0.99973	3.96	0.99996
2.47	0.99324	2.97	0.99851	3.47	0.99974	3.97	0.99996
2.48	0.99343	2.98	0.99856	3.48	0.99975	3.98	0.99997
2.49	0.99361	2.99	0.99861	3.49	0.99976	3.99	0.99997
2.50	0.99379	3.00	0.99865	3.50	0.99977	4.00	0.99997